



## TUCHSCHER ENGINEERING GROUP

L'Opera Building  
115 Pine Ave, Suite 210  
Long Beach, CA 90802  
310.613.9980  
[www.TEGLosAngeles.com](http://www.TEGLosAngeles.com)

### HYDROLOGY ANALYSIS


#### SINGLE FAMILY RESIDENCE

Project:

**Herzig-Gold Residence**  
3045 Tuna Canyon Road  
Topanga Canyon, CA 90290

Prepared for:

**Leigh Herzig**  
3045 Tuna Canyon Road  
Topanga Canyon, CA 90290

STAMP

DATE
9/22/2020
Jasreen Brar Design Engineer

JOB # 7-19-1733  
DATE 9/22/2020



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3045 Tuna Canyon Road  
Topanga Canyon, CA 90290

**JOB #** 7-19-1733  
**DATE** 9/22/2020

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STAMP



DATE

9/22/2020

Jasreen Brar  
Design Engineer



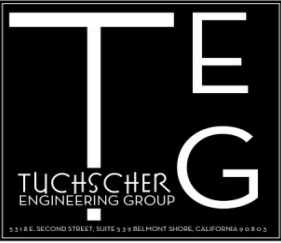
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SECTION	1.0
SHEET #	2
ENG.	JB
DATE	9/22/2020
JOB #	7-19-1733

## 1.0 HYDROLOGY SUMMARY

STORMWATER MANAGEMENT DESIGN	
<b>PROTECTION LEVEL</b>	
Design Storm Frequency	25 Year
<b>PRE-DEVELOPMENT PEAK RUNOFF RATE</b>	
Q=	6220.5 gpm
C=	0.67
I=	5.50 in/hr
A=	163981.0 sq.ft.
<b>POST-DEVELOPMENT PEAK RUNOFF RATE</b>	
Q=	6220.5 gpm
C=	0.67
I=	5.50 in/hr
A=	163981.0 sq.ft.
DRAINAGE DEVICE SIZING	
<b>RUNOFF RATES</b>	
Q=	0.038 gpm/sq.ft.
C=	0.037 gpm/sq.ft.
I=	0.057 gpm/sq.ft.
<b>MINIMUM PIPE SIZING</b>	
PIPE 1 =	4.59in
PIPE 2 =	2.78in
PIPE 3 =	2.99in
PIPE 4 =	
<b>DOWNSPOUT MAXIMUM TRIBUTARY AREA</b>	
3" DOWNSPOUT	352.8 sq.ft.
4" DOWNSPOUT	529.1 sq.ft.
<b>AREA DRAIN MAXIMUM TRIBUTARY AREA</b>	
6" AREA DRAIN	303.9 sq.ft.
4" AREA DRAIN	121.4 sq.ft.
<b>SWALE DESIGN</b>	
SWALE #1	NOT IN USE
SWALE #2	NOT IN USE



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SECTION	2.0
SHEET #	1
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## 2.0 DESIGN CRITERIA

BUILDING CODE	2016 County of Los Angeles Building Code
METHOD	Los Angeles County Department of Public Works Hydrology Manual Rational Method
STORM FREQUENCY	25 Year



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SECTION 3.0  
SHEET # 3  
ENG. JB  
DATE 9/22/2020  
JOB # 7-19-1733

## 3.0 PRE-DEVELOPMENT RUNOFF RATE

### PEAK SURFACE RUNOFF RATE CALCULATION

TOTAL SURFACE Q =	6220.5 gpm
C =	0.67
I =	5.50
A =	163981.00

$$\text{Total Surface Runoff Rate } Q = C_d * I * A$$

Surface Runoff Coefficient $C_d$	
Total Area	= 163,981.0 sq. ft.
Impervious Area	= 6209.90 sq. ft.
% Impervious	= 4%
Undeveloped Runoff Coefficient $C_u$	= 0.66
$C_d = (0.9 * 0.04) + (1 - 0.04) * 0.66$	
$C_d$	= 0.67

SEE PAGE 8

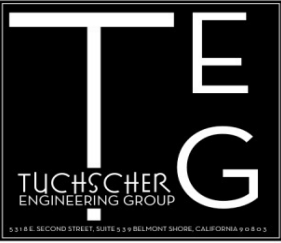
Rainfall Intensity I	
Storm Frequency:	25 year
Time of Concentration $t_c$	= 5 min
Isohyetal Depth:	10.5 in
$I_{(1440/50\text{YEAR})}$	= Isohyetal Depth / 24 * F
$I_{(1440/25\text{YEAR})}$	= 10.5 in / 24 hr * 0.878
$I_{(1440/25\text{YEAR})}$	= 0.38413 in/hr
$I_{(5/25\text{YEAR})}$	= $I_{(1440/25\text{YEAR})} * (1440/t_c)^{0.47}$
$I_{(5/25\text{YEAR})}$	= 0.38 in/hr * $(1440/t_c)^{0.47}$
$I_{(5/25\text{YEAR})}$	= 5.50 in/hr

Note: Rainfall intensity based on LADPW isohyetal maps. Isohyetal maps are based a 24 hour period with a 50-year storm frequency. Intensity must be converted based on the level of protection required or storm frequency and time of concentration.

Rainfall Frequency Factor	
Frequency (yr)	Factor F
2	0.387
5	0.584
10	0.714
25	0.878
50	1.00
100	1.122
500	1.402

\*Per LADPW Hydrology Manual T.5.3.1

Area A	
Total Area =	163,981.0 sq. ft. Area A = 3.76449 acres
Impermeable $A_i$ =	6209.90 sq. ft. Area $A_i$ = 0.14256 acres
Permeable $A_p$ =	157,771.1 sq. ft. Area $A_p$ = 3.62193 acres



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SECTION	3.0
SHEET #	4
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JOB #	7-19-1733

3.0 PRE-DEVELOPMENT RUNOFF RATE

RAINFALL INTENSITY AND SOIL CLASSIFICATION

Rainfall Depth = 10.5 in      Soil Classification = 30

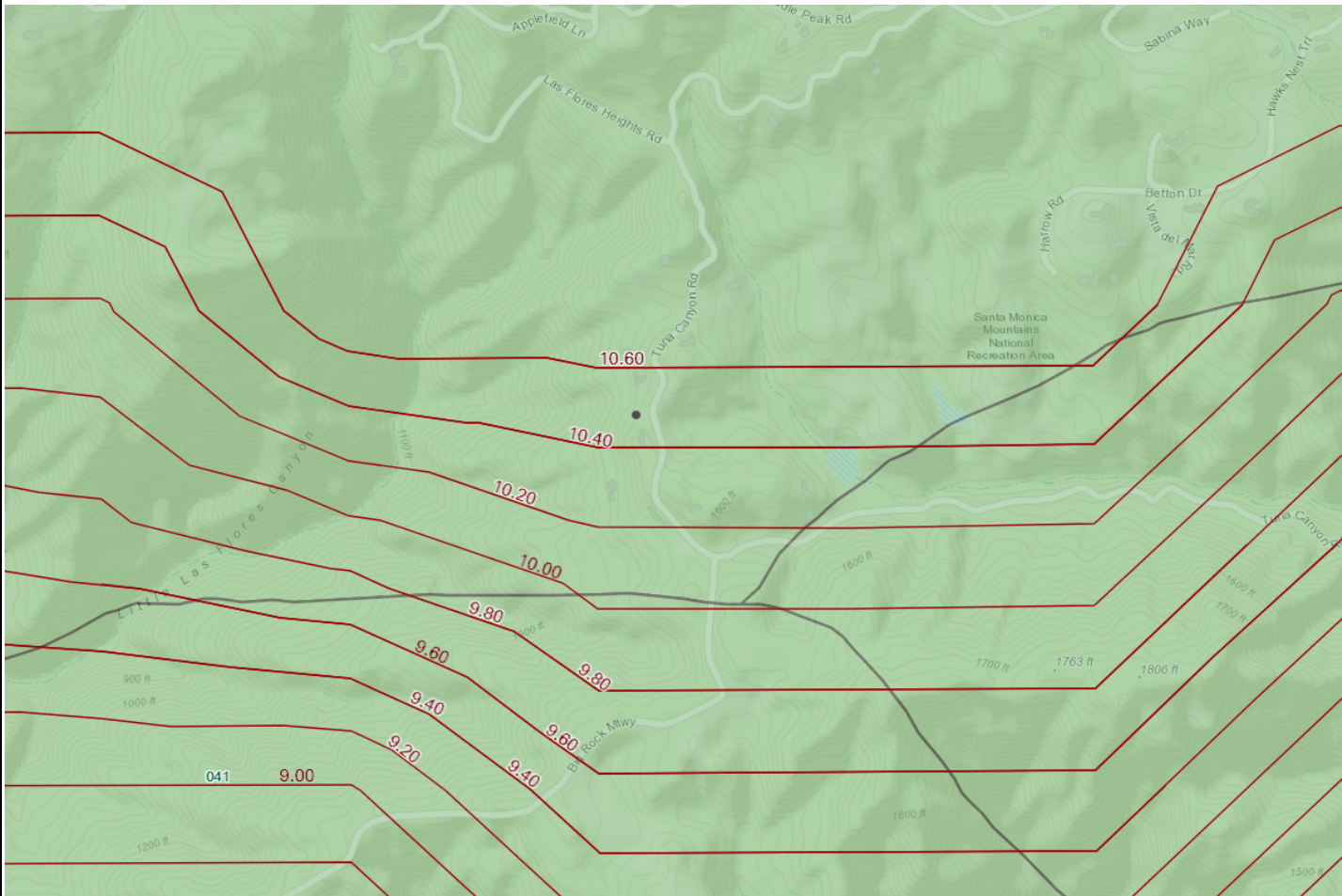


FIGURE: LADPW ISOHYETAL AND SOIL CLASSIFICATION MAP



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DATE 9/22/2020  
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## 3.0 PRE-DEVELOPMENT RUNOFF RATE

### SOIL CLASSIFICATION

SOIL ID # = 30

Soil Name = Santa Monica Mountains

Soil Identification Table

Number	Name	Original Name
2	ALTAMONT CLAY LOAM	A
3	CHINO SILT LOAM	CS-1
4	DIABLO CLAY LOAM	DY
5	HANFORD FINE SANDY LOAM	HF
6	HANFORD FINE SANDY LOAM	HF-1
7	HANFORD GRAVELLY SANDY LOAM	HG
8	HANFORD SILT LOAM	HN
9	MONTEZUMA CLAY ADOBE	M
10	OAKLEY FINE SAND	OS
11	PLACENTIA LOAM	PL
12	RAMONA CLAY LOAM	RC- 1
13	RAMONA LOAM	RO
14	RAMONA SANDY LOAM	RS
15	TUJUNGA FINE SANDY LOAM	TF
16	YOLO LOAM	Y
17	YOLO CLAY LOAM	YC
18	YOLO FINE SANDY LOAM	YF
19	YOLO GRAVELLY SANDY LOAM	YG
20	YOLO SANDY LOAM	YS
21	SANTA MONICA MOUNTAINS	SMM-1
22	SANTA MONICA MOUNTAINS	SMM-2
23	SANTA MONICA MOUNTAINS	SMM-3
24	SANTA MONICA MOUNTAINS	SMM-4
25	SANTA MONICA MOUNTAINS	SMM-5
26	SANTA MONICA MOUNTAINS	SMM-6
27	SANTA MONICA MOUNTAINS	SMM-7
28	SANTA MONICA MOUNTAINS	SMM-8
29	SANTA MONICA MOUNTAINS	SMM-9
30	SANTA MONICA MOUNTAINS	SMM-10
31	SANTA MONICA MOUNTAINS	SMM- 11
32	SANTA MONICA MOUNTAINS	SMM-12
33	SANTA MONICA MOUNTAINS	SMM-13
34	SANTA MONICA MOUNTAINS	SMM-14
35	SANTA MONICA MOUNTAINS	SMM-15
36	SANTA MONICA MOUNTAINS	SMM-16
37	SANTA MONICA MOUNTAINS	SMM- 17
38	SANTA MONICA MOUNTAINS	SMM- 18





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SECTION	3.0
SHEET #	6
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DATE	9/22/2020
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3.0 PRE-DEVELOPMENT RUNOFF RATE

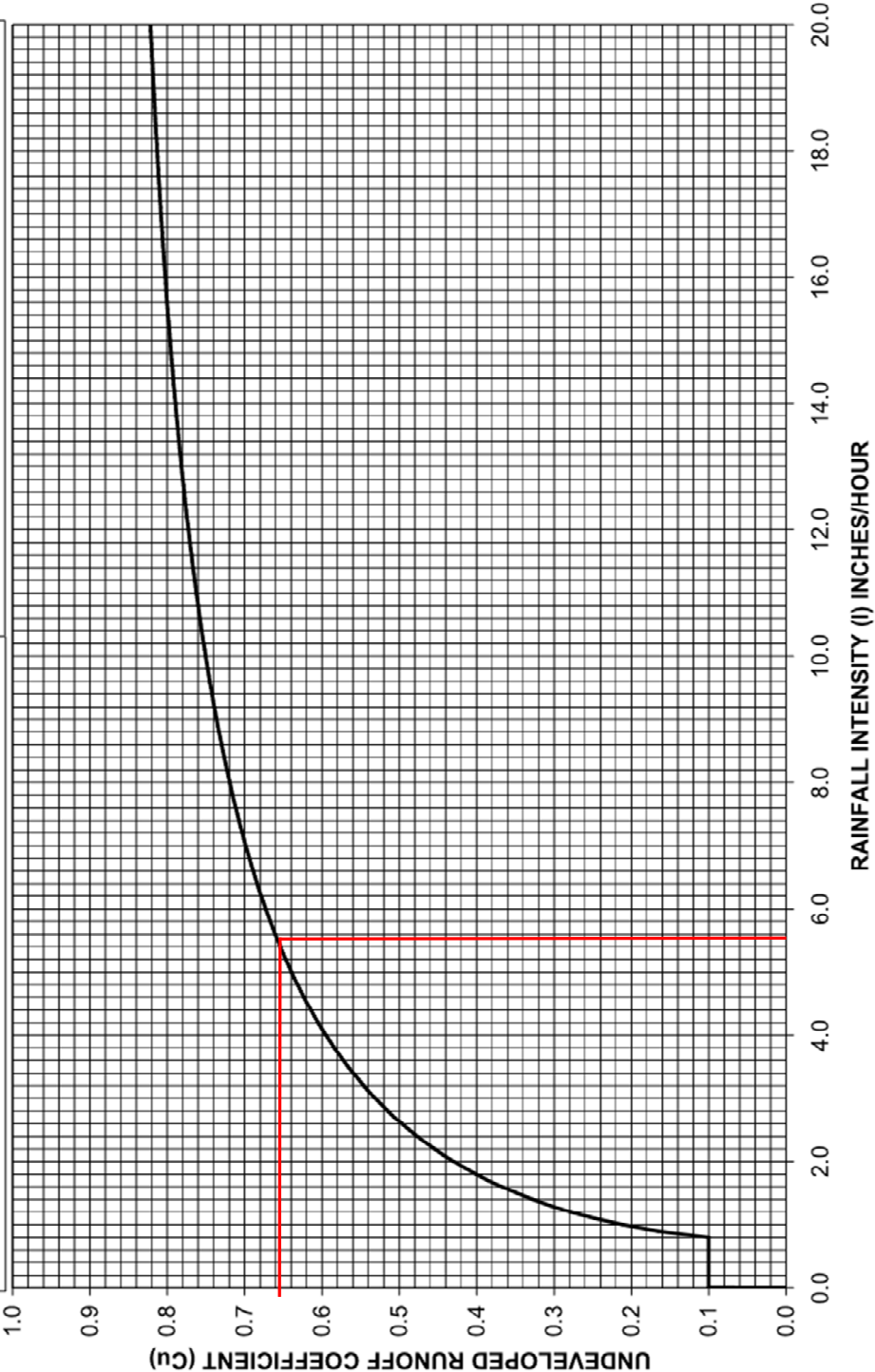
UNDEVELOPED RUNOFF COEFFICIENT

C<sub>u</sub> Coefficient = 0.66



Los Angeles County Department of Public Works  
RUNOFF COEFFICIENT CURVE  
SOIL TYPE NO. 030

$C_D = (0.9 \cdot IMP) + (1.0 - IMP) \cdot C_u$   
Where: C<sub>D</sub> = Developed Runoff Coefficient  
IMP = Proportion Impervious  
C<sub>u</sub> = Undeveloped runoff coefficient







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SECTION 3.0  
SHEET # 7  
ENG. JB  
DATE 9/22/2020  
JOB # 7-19-1733

## 3.0 PRE-DEVELOPMENT RUNOFF RATE

### TIME OF CONCENTRATION

Tc = 5 min

Tc Calculator

Subarea Parameters Manual Input

Subarea Number	Fire Factor	
1a	1	
Area (Acres)	Proportion Impervious	Soil Type
3.76	.04	30
Rainfall Isohyet (in.)	Flow Path Length (ft.)	Flow Path Slope
10.5	516.6	.48

Subarea Parameters Selected

Subarea Number	Fire Factor	
1a	1	
Area (Acres)	Proportion Impervious	Soil Type
3.76	0.04	30
Rainfall Isohyet (in.)	Flow Path Length (ft.)	Flow Path Slope
10.5	516.6	0.48

Input File

☐ Check Here If Subarea Parameters Are Defined In An Input F
 

Import "tcddata.xls" File

☐ Calculate Single Tc From Subarea Parameters Provided In Input F
 ☒ Calculate Tc's For Multiple Subareas And Create Tc Results Fil

Calculation Results

Subarea Number	Intensity	Undeveloped Runoff Coefficient (Cu)	Developed Runoff Coefficient (Cd)	<input checked="" type="checkbox"/> Calculate Runoff Volum
1a	6.26	0.68	0.69	

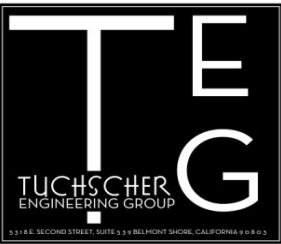
Tc Equation

Tc= (10)^-0.507\*(Cd\*I)^-0.519\*(L)^0.483\*(S)^-0.135

Calculate T

Cancel

Tc Value (min.)	Peak Flow Rate (cfs)	Burned Peak Flow Rate (cfs)	24-Hour Runoff Volume
5	16.24	19.4	0.64



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SECTION	4.0
SHEET #	8
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## 4.0 POST-DEVELOPMENT RUNOFF RATE

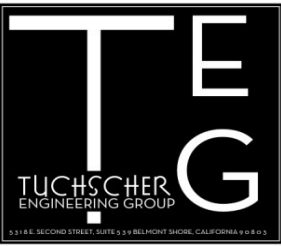
### PEAK SURFACE RUNOFF RATE CALCULATION

TOTAL SURFACE Q =	6220.5 gpm
C =	0.67
I =	5.50
A =	163981.00

$$\text{Total Surface Runoff Rate } Q = C_d * I * A$$

Surface Runoff Coefficient $C_d$		
Total Area	=	163,981.0 sq. ft.
Impervious Area	=	6209.90 sq. ft.
% Impervious	=	3.79%
Undeveloped Runoff Coefficient $C_u$	=	0.66
$C_d = (0.9 * 0.04) + (1 - 0.04) * 0.66$		
$C_d$	=	0.67
		SEE PAGE 8

Post Development Area A			
Total Area =	163,981.0 sq. ft.	Area A =	3.76449 acres
Impermeable $A_i$ =	6209.90 sq. ft.	Area $A_i$ =	0.14256 acres
Permeable $A_p$ =	157,771.1 sq. ft.	Area $A_p$ =	3.62193 acres



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SECTION 5.0  
SHEET # 9  
ENG. JB  
DATE 9/22/2020  
JOB # 7-19-1733

## 5.0 SURFACE RUNOFF RATE SUMMARY

SUMMARY OF SURFACE RUNOFF RATES				
SITE AREA	DEVELOPED PEAK FLOW RATE	RUNOFF RATES		
		Total Area	Softscape	Impermeable
163981.0 sq.ft.	6220.5 gpm	0.038 gpm/sq.ft.	0.037 gpm/sq.ft.	0.057 gpm/sq.ft.



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SECTION	6.0
SHEET #	10
ENG.	JB
DATE	9/22/2020
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## 6.0 PIPE DESIGN

PIPE #1		
<b>Pipe Description:</b>	Northern Pipe run	
Drainage Area Type:	impermeable area	
Drainage Area Used:	0.057 sq. ft.	
Total Site Q/sq.ft. =	0.038 gpm/sq.ft.	
Impermeable Q/sq.ft. =	0.057 gpm/sq.ft.	
Permeable Q/sq.ft. =	0.037 gpm/sq.ft.	
Slope (s) =	0.025	
Roughness Coefficient (n) =	0.011	
TRIBUTARY DRAINAGE INFORMATION		
DRAINAGE DEVICE OR OREA	AREA sq. ft.	Q gpm
Garage & Addition	4056.7	230.0
TOTAL	4056.7	230.0
TOTAL (CFS)		0.512
Manning Equation required diameter $d = \left( \frac{2.159 * Q * n}{s^{1/2}} \right)^{3/8}$  $d = \left( \frac{2.159 * 0.512 \text{ cfs} * 0.011}{0.025^{1/2}} \right)^{3/8}$		
DIAMETER OF PIPE REQUIRED =		4.59in

PIPE #2		
<b>Pipe Description:</b>	South East Pipe Run	
Drainage Area Type:	impermeable area	
Drainage Area Used:	0.057 sq. ft.	
Total Site Q/sq.ft. =	0.038 gpm/sq.ft.	
Impermeable Q/sq.ft. =	0.057 gpm/sq.ft.	
Permeable Q/sq.ft. =	0.037 gpm/sq.ft.	
Slope (s) =	0.02	
Roughness Coefficient (n) =	0.011	
TRIBUTARY DRAINAGE INFORMATION		
DRAINAGE DEVICE OR OREA	AREA sq. ft.	Q gpm
Acc. Struct. & Pool House	760.1	43.1
Patio	194	11.0
TOTAL	954.1	54.1
TOTAL (CFS)		0.120
Manning Equation required diameter $d = \left( \frac{2.159 * Q * n}{s^{1/2}} \right)^{3/8}$  $d = \left( \frac{2.159 * 0.12 \text{ cfs} * 0.011}{0.02^{1/2}} \right)^{3/8}$		
DIAMETER OF PIPE REQUIRED =		2.78in



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SECTION	6.0
SHEET #	11
ENG.	JB
DATE	9/22/2020
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## 6.0 PIPE DESIGN

PIPE #3		
<b>Pipe Description:</b>	South Pipe Run	
Drainage Area Type:	impermeable area	
Drainage Area Used:	0.057 sq. ft.	
Total Site Q/sq.ft. =	0.038 gpm/sq.ft.	
Impermeable Q/sq.ft. =	0.057 gpm/sq.ft.	
Permeable Q/sq.ft. =	0.037 gpm/sq.ft.	
Slope (s) =	0.02	
Roughness Coefficient (n) =	0.011	
TRIBUTARY DRAINAGE INFORMATION		
DRAINAGE DEVICE OR OREA	AREA sq. ft.	Q gpm
Area Around Pool	1162.4	65.9
TOTAL	1162.4	65.9
TOTAL (CFS)		0.147
Manning Equation required diameter $d = \left( \frac{2.159 * Q * n}{s^{1/2}} \right)^{3/8}$  $d = \left( \frac{2.159 * 0.147 \text{ cfs} * 0.011}{0.02^{1/2}} \right)^{3/8}$		
DIAMETER OF PIPE REQUIRED =		2.99in



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SECTION	7.0
SHEET #	12
ENG.	JB
DATE	9/22/2020
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## 7.0 DOWNSPOUT DESIGN

DOWNSPOUT TABLE			
DESCRIPTION	SIZE	Q GPM	MAX TRIBUTARY AREA SQ FT
Maximum Downspout Area	3	20	352.8
Maximum Downspout Area	4	30	529.1

STORM DRAINAGE

Table 11-1

TABLE 11-1 Sizing Roof Drains, Leaders, and Vertical Rainwater Piping <sup>1,2,3</sup>								
Size of Drain, Leader, or Pipe, Inches		Flow, gpm		Maximum Allowable Horizontal Projected Roof Areas Square Feet at Various Rainfall Rates				
				1 in./h	2 in./h	3 in./h	4 in./h	5 in./h
2	23	2,176	1,088	725	544	435	363	
3	67	6,440	3,220	2,147	1,610	1,288	1,073	
4	144	13,840	6,920	4,613	3,460	2,768	2,307	
5	261	25,120	12,560	8,373	6,280	5,024	4,187	
6	424	40,800	20,400	13,600	10,200	8,160	6,800	
8	913	88,000	44,000	29,333	22,000	17,600	14,667	

FIGURE: CPC TABLE 11-1




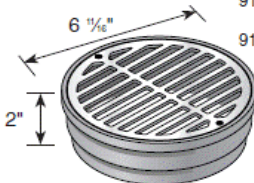
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SECTION	8.0
SHEET #	13
ENG.	JB
DATE	9/22/2020
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**8.0 AREA DRAIN DESIGN**

AREA DRAIN TABLE							
DESCRIPTION	SIZE	Q GPM	MAX TRIBUTARY AREA SQ FT				
Maximum Area Drain Area	6	17.23	303.9				
Maximum Area Drain Area	4	6.88	121.4				

Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
918B	6" Round Brass Grate w/Styrene Collar	Satin Brass	8	1.38	15BR	NDS #918B or #919PB, 6" Round Solid Brass Grate and Brass screws with styrene collar. Open surface area 13.15 square inches. 17.23 GPM.
919PB	6" Round Brass Grate w/Styrene Collar	Polished Brass	8	1.38	15BR	
Fits Spee-D® Basin, 6" Sewer & Drain Fittings.						
 (See pg. 48) ADA Compliant/Heel-proof						




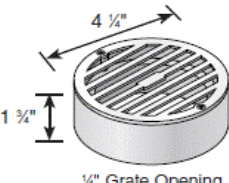
6 1/8"

2"

3/8" Grate Opening

**FIG. NDS PRODUCT CATALOG FOR 6" ROUND AREA DRAIN**

Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
917SC	4" Round Chrome Grate w/PVC Collar	Satin Chrome	20	0.70	15BR	NDS #917SC or #908PC, 4" Round Chrome Grate and screws with PVC collar. Open surface area 5.25 square inches. 6.88 GPM.
908PC	4" Round Chrome Grate w/PVC Collar	Polished Chrome	20	0.70	15BR	
Fits 3" Sewer & Drain Pipe, 4" Sewer & Drain Fittings.						
 (See pg. 48) ADA Compliant/Heel-proof						



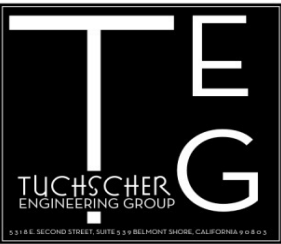
4 1/4"

1 1/4"

1/4" Grate Opening

**FIG. NDS PRODUCT CATALOG FOR 4" ROUND AREA DRAIN**





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SECTION 9.0  
SHEET # 14  
ENG. JB  
DATE 9/22/2020  
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## 9.0 LID SELECTION

LID MATRIX			
	DESCRIPTION	CAPACITY REQUIREMENTS	OTHER REQUIREMENTS
POROUS PAVEMENT	Includes porous asphalt, porous concrete, ungrouted paving blocks, and gravel	50% OF SITE PAVEMENT	GEOTECHNICAL REPORT
DOWNSPOUT ROUTING	Each downspout must directed to a rain barrel/cistern or garden planter box.	200 GAL TOTAL CAPACITY	
DISCONNECT IMPERVIOUS SURFACES	Slope impervious surfaces to drain toward pervious. Preference to direct to vegetated areas or other BMPs	1/3 OF LOT MUST BE PERVIOUS	TOTAL AREA NOT DIRECTED TO VEGETATION LIMITED TO 10% OF TOTAL SITE AREA
DRY WELL	Drywell to infiltrate stormwater runoff	200 GAL MIN. INFILTRATION WITHIN 96 HOURS	GEOTECHNICAL REPORT
LANDSCAPING AND LANDSCAPE IRRIGATION	Plant trees near impervious to intercept precipitation.	(2) 15 GALLON TREES A MAXIMUM OF 10 FEET FROM IMPERVIOUS	IRRIGATION SYSTEM WITH WEATHER BASED SMART IRRIGATION CONTROLLER
GREEN ROOF	Install green roof to retain and treat stormwater runoff.	50% of roof	

LID SELECTION					
BMP 1	LANDSCAPING AND LANDSCAPE IRRIGATION	Total Trees	Distance to Hardscape	Weather Based Smart Irrigation Controller?	
		15 gal	ft		
		2	7		
BMP 2	POROUS PAVEMENT	Porous Pavement	Total Pavement	%	Geotechnical Report?
		sq.ft.	sq.ft.	58.6%	
		986	1684		